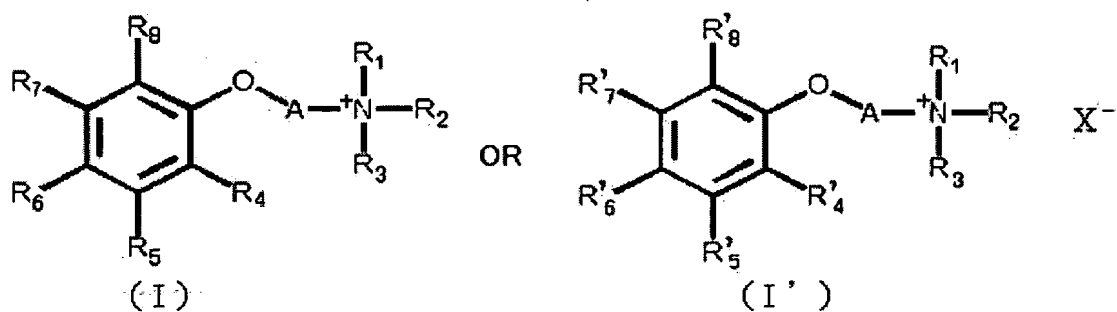


# CLAIMS

1. A quaternary ammonium compound represented by general formula (I) or (I'):



(wherein, A represents a linear alkyl group having 1 to 4 carbon atoms, a branched alkyl group having 2 to 4 carbon atoms, a linear alkyl group having 1 to 4 carbon atoms and a hydroxyl group, or a branched alkyl group having 2 to 4 carbon atoms and a hydroxyl group,  $R_1$  to  $R_3$  may be the same or different and represent a linear or branched alkyl group having 1 to 12 carbon atoms, one of  $R_4$  to  $R_8$  represents  $\text{CO}_2^-$  or  $\text{SO}_3^-$ , while no more than three of the remaining  $R_4$  to  $R_8$  represent a group selected from the group consisting of a hydroxyl group and an alkoxy group having 1 to 4 carbon atoms, and other  $R_4$  to  $R_8$  represent a hydrogen atom, one of  $R'_4$  to  $R'_8$  represents  $\text{CO}_2\text{H}$  or  $\text{SO}_3\text{H}$ , no more than three of the remaining  $R'_4$  to  $R'_8$  represent a group selected from a protected hydroxyl group and an alkoxy group having 1 to 4 carbon atoms, while other  $R'_4$  to  $R'_8$  represent a hydrogen atom, and  $\text{X}^-$  represents an anion capable of forming a salt with

a quaternary ammonium group).

2. A quaternary ammonium compound according to claim 1, wherein one of  $R_4$  to  $R_8$  is  $\text{CO}_2^-$ , or one of  $R'_4$  to  $R'_8$  is  $\text{CO}_2\text{H}$ .

3. A quaternary ammonium compound according to claim 1, wherein one of  $R_4$  to  $R_8$  is  $\text{SO}_3^-$ , or one of  $R'_4$  to  $R'_8$  is  $\text{SO}_3\text{H}$ .

4. A quaternary ammonium compound according to claim 2, wherein one of the remaining  $R_4$  to  $R_8$  or one of the remaining  $R'_4$  to  $R'_8$  is a hydroxyl group.

5. A quaternary ammonium compound according to claim 3, wherein one of the remaining  $R_4$  to  $R_8$  or one of the remaining  $R'_4$  to  $R'_8$  is a hydroxyl group.

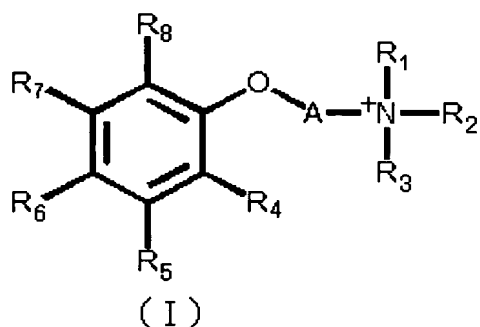
6. A quaternary ammonium compound according to claim 4, wherein A is a linear alkyl group having 2 carbon atoms.

7. A quaternary ammonium compound according to claim 5, wherein A is a linear alkyl group having 2 carbon atoms.

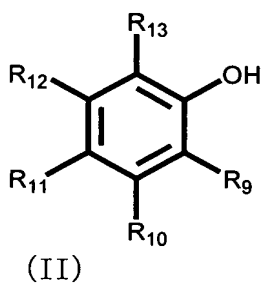
8. A quaternary ammonium compound according to claim 6, wherein  $R_1$  to  $R_3$  are methyl groups.

9. A quaternary ammonium compound according to claim 7, wherein  $R_1$  to  $R_3$  are methyl groups.

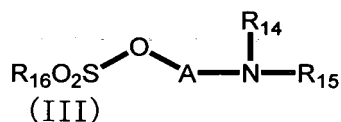
10. A process for producing a quaternary ammonium compound represented by general formula (I):



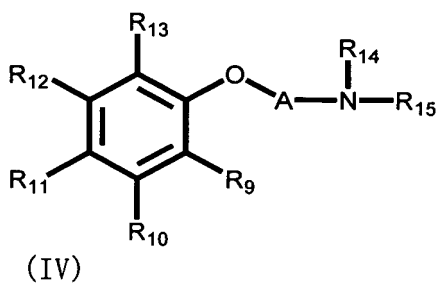
(wherein, A represents a linear alkyl group having 1 to 4 carbon atoms, a branched alkyl group having 2 to 4 carbon atoms, a linear alkyl group having 1 to 4 carbon atoms and a hydroxyl group, or a branched alkyl group having 2 to 4 carbon atoms and a hydroxyl group,  $R_1$ ,  $R_2$  and  $R_3$  may be the same or different and represent a linear or branched alkyl group having 1 to 12 carbon atoms, one of  $R_4$  to  $R_8$  represents  $\text{CO}_2^-$  or  $\text{SO}_3^-$ , while no more than three of the remaining  $R_4$  to  $R_8$  represent a group selected from the group consisting of a hydroxyl group and an alkoxy group having 1 to 4 carbon atoms, and other  $R_4$  to  $R_8$  represent a hydrogen atom) comprising: reacting with a phenol derivative represented by general formula (II):



(wherein, one of R<sub>9</sub> to R<sub>13</sub> represents a carboxyl group protected or a sulfonic acid group by an ester group, no more than three of the remaining R<sub>9</sub> to R<sub>13</sub> represent a group selected from the group consisting of a protected hydroxyl group and an alkoxy group having 1 to 4 carbon atoms, and other R<sub>9</sub> to R<sub>13</sub> represent a hydrogen atom) a sulfonic acid ester derivative represented by general formula (III):

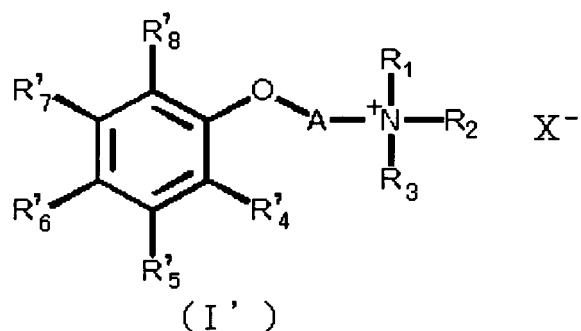


(wherein, A represents a linear alkyl group having 1 to 4 carbon atoms, a branched alkyl group having 2 to 4 carbon atoms, a linear alkyl group having 1 to 4 carbon atoms and a hydroxyl group, or a branched alkyl group having 2 to 4 carbon atoms and a hydroxyl group, R<sub>14</sub> to R<sub>15</sub> may be the same or different and represent a linear or branched alkyl group having 1 to 12 carbon atoms, and R<sub>16</sub> represents a lower alkyl group having 1 to 4 carbon atoms or an aryl group having 6 to 7 carbon atoms) in an organic solvent and in the presence of a basic substance, to obtain a amino compound represented by general formula (IV):

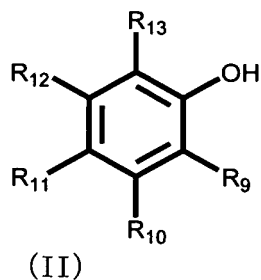


(wherein, A represents a linear alkyl group having 1 to 4 carbon atoms, a branched alkyl group having 2 to 4 carbon atoms, a linear alkyl group having 1 to 4 carbon atoms and a hydroxyl group, or a branched alkyl group having 2 to 4 carbon atoms and a hydroxyl group, one of R<sub>9</sub> to R<sub>13</sub> represents a carboxyl group or a sulfonic acid group protected by an ester group, no more than three of the remaining R<sub>9</sub> to R<sub>13</sub> represent a group selected from the group consisting of a protected hydroxyl group and an alkoxy group having 1 to 4 carbon atoms, other R<sub>9</sub> to R<sub>13</sub> represent a hydrogen atom, and R<sub>14</sub> to R<sub>15</sub> may be the same or different and represent a linear or branched alkyl group having 1 to 12 carbon atoms), and a linear or branched alkyl halide having 1 to 12 carbon atoms or a sulfonic acid ester esterified by a linear or branched alkyl group having 1 to 12 carbon atoms is reacted with a compound represented by general formula (IV), followed by de-protecting the carboxyl group or the sulfonic acid group protected by an ester group, and the protected hydroxyl group, and treating with an ion exchange resin.

11. A process for producing a quaternary ammonium compound represented by general formula (I'):

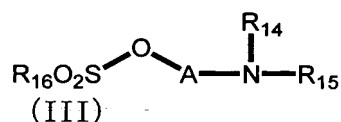


(wherein, A represents a linear alkyl group having 1 to 4 carbon atoms, a branched alkyl group having 2 to 4 carbon atoms, a linear alkyl group having 1 to 4 carbon atoms and a hydroxyl group, or a branched alkyl group having 2 to 4 carbon atoms and a hydroxyl group,  $R_1$ ,  $R_2$  and  $R_3$  may be the same or different and represent a linear or branched alkyl group having 1 to 12 carbon atoms, one of  $R'_4$  to  $R'_8$  represents  $\text{CO}_2\text{H}$  or  $\text{SO}_3\text{H}$ , while no more than three of the remaining  $R'_4$  to  $R'_8$  represent a group selected from the group consisting of a hydroxyl group and an alkoxy group having 1 to 4 carbon atoms, other  $R'_4$  to  $R'_8$  represent a hydrogen atom, and  $\text{X}^-$  represents an anion capable of forming a salt with a quaternary ammonium group) comprising: reacting with a phenol derivative represented by general formula (II):

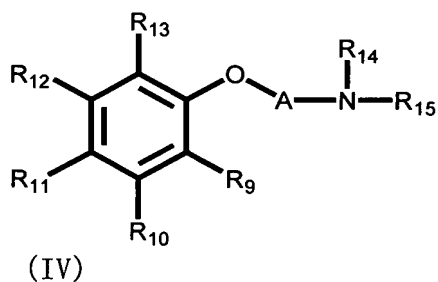


(wherein, one of  $R_9$  to  $R_{13}$  represents a carboxyl group or a

sulfonic acid group protected by an ester group, no more than three of the remaining  $R_9$  to  $R_{13}$  represent a group selected from the group consisting of a protected hydroxyl group and an alkoxy group having 1 to 4 carbon atoms, and other  $R_9$  to  $R_{13}$  represent a hydrogen atom) a sulfonic acid ester derivative represented by general formula (III):



(wherein, A represents a linear alkyl group having 1 to 4 carbon atoms, a branched alkyl group having 2 to 4 carbon atoms, a linear alkyl group having 1 to 4 carbon atoms and a hydroxyl group, or a branched alkyl group having 2 to 4 carbon atoms and a hydroxyl group,  $R_{14}$  to  $R_{15}$  may be the same or different and represent a linear or branched alkyl group having 1 to 12 carbon atoms, and  $R_{16}$  represents a lower alkyl group having 1 to 4 carbon atoms or an aryl group having 6 to 7 carbon atoms) in an organic solvent and in the presence of a basic substance, to obtain an amino compound represented by general formula (IV):



(wherein, A represents a linear alkyl group having 1 to 4 carbon atoms, a branched alkyl group having 2 to 4 carbon atoms, a linear alkyl group having 1 to 4 carbon atoms and a hydroxyl group, or a branched alkyl group having 2 to 4 carbon atoms and a hydroxyl group, one of R<sub>9</sub> to R<sub>13</sub> represent a carboxyl group or a sulfonic acid group protected by an ester group, no more than three of the remaining R<sub>9</sub> to R<sub>13</sub> represent a group selected from the group consisting of a protected hydroxyl group and an alkoxy group having 1 to 4 carbon atoms, other R<sub>9</sub> to R<sub>13</sub> represent a hydrogen atom, and R<sub>14</sub> to R<sub>15</sub> may be the same or different and represent a linear or branched alkyl group having 1 to 12 carbon atoms), and a linear or branched alkyl halide having 1 to 12 carbon atoms or a sulfonic acid ester esterified by a linear or branched alkyl group having 1 to 12 carbon atoms is reacted with a compound represented by general formula (IV), followed by de-protecting the carboxyl group or the sulfonic acid group protected by an ester group, and the protected hydroxyl group, and treating with an acidic substance.

12. A process for producing a quaternary ammonium compound represented by general formula (I) or (I') according to claim 10, wherein the organic solvent used in the step for reacting a sulfonic acid ester derivative represented by general formula (III) with a phenol derivative represented by general formula (II) is an alcohol, ether or amide organic solvent.



13. A process for producing a quaternary ammonium compound represented by general formula (I) or (I') according to claim 12, wherein  $R_{16}$  of general formula (III) is a methyl group.
14. A process for producing a quaternary ammonium compound represented by general formula (I) or (I') according to claim 13, wherein the organic solvent used in the step for reacting a sulfonic ester derivative represented by general formula (III) with a phenol derivative represented by general formula (II) is an ether organic solvent having 4 to 6 carbon atoms.
15. A cerebrovascular disease therapeutic agent having for an active ingredient a quaternary ammonium compound according to claim 1.
16. A cerebrovascular disease therapeutic agent according to claim 15, wherein the cerebrovascular disease is cerebral infarction, cerebral thrombosis, cerebral embolism, transient ischemic attack or a functional disorder caused by these diseases.
17. A use of a quaternary ammonium compound according to claim 1 for producing a cerebrovascular disease therapeutic agent.
18. A treatment method for a cerebrovascular disease using a quaternary ammonium compound according to claim 1.
19. A heart disease therapeutic agent having for an active ingredient thereof a quaternary ammonium compound according to claim 1.

20. A use of a quaternary ammonium compound according to claim 1 to produce a heart disease therapeutic agent.

21. A treatment method for a heart disease using a quaternary ammonium compound according to claim 1.